



IMMUNIZATION AND THE FIGHT AGAINST DISEASE: A SHORT HISTORY OF VACCINES IN THE U.S. NAVY

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On December 14, 2020 the Naval Medical Center San Diego became one of the first US military installations to receive the Pfizer COVID-19 vaccine. Over the next days photographs of Sailors, and Marines getting the “shot in the arm” became more widespread—and with it the prospect of a post-COVID-19 world became all the more real.

The administration of the COVID-19 Pfizer and Moderna vaccines may not yet mark the total eradication of the coronavirus, but it is another important chapter in the Navy’s long history with vaccines. For almost as long as there has been a US Navy, naval medical personnel have turned to vaccines for preventing the spread of communicable diseases and for lessening the impact of disease on operational readiness.

Smallpox, the First Vaccination

Long before there were vaccines, immunization was obtained through means of variolation. From the root word “variola” (Latin for “smallpox”), variolation was the practice of exposing someone to the smallpox virus through pus, vesicles or ground scabs taken from individuals with mild forms of the disease. For much of the eighteenth century this was a common practice for the American colonies and was used to immunize Soldiers, Sailors and Marines against smallpox in the Revolutionary War.

The practice of vaccination—and the very word “vaccine”—began with Dr. Edward Jenner. In 1796, Jenner first immunized an 8-year old child against smallpox through the exposure of lesions from a bovine infected with cow pox. He referred to his immunization as “vacca” (from the Latin for “cow”) and the process “vaccination.” Jenner published his groundbreaking treatise in 1798.

The following year, Surgeon Edward Cutbush of USS *United States* reported that he “vaccinated” 12 sailors against smallpox while the ship was off of Charleston, South Carolina. This arguably is the first reported vaccination in the history of the US Navy and, in turn, those sailors can be considered some of the first service personnel ever vaccinated. Nine years later, Cutbush was the attending physician during at the Marine Barracks in Philadelphia, Pennsylvania when a smallpox outbreak occurred. On March 26, 1808, Cutbush reported to Secretary of the Navy Robert Smith that he vaccinated 13 Marines to “arrest” the progress of the virus.



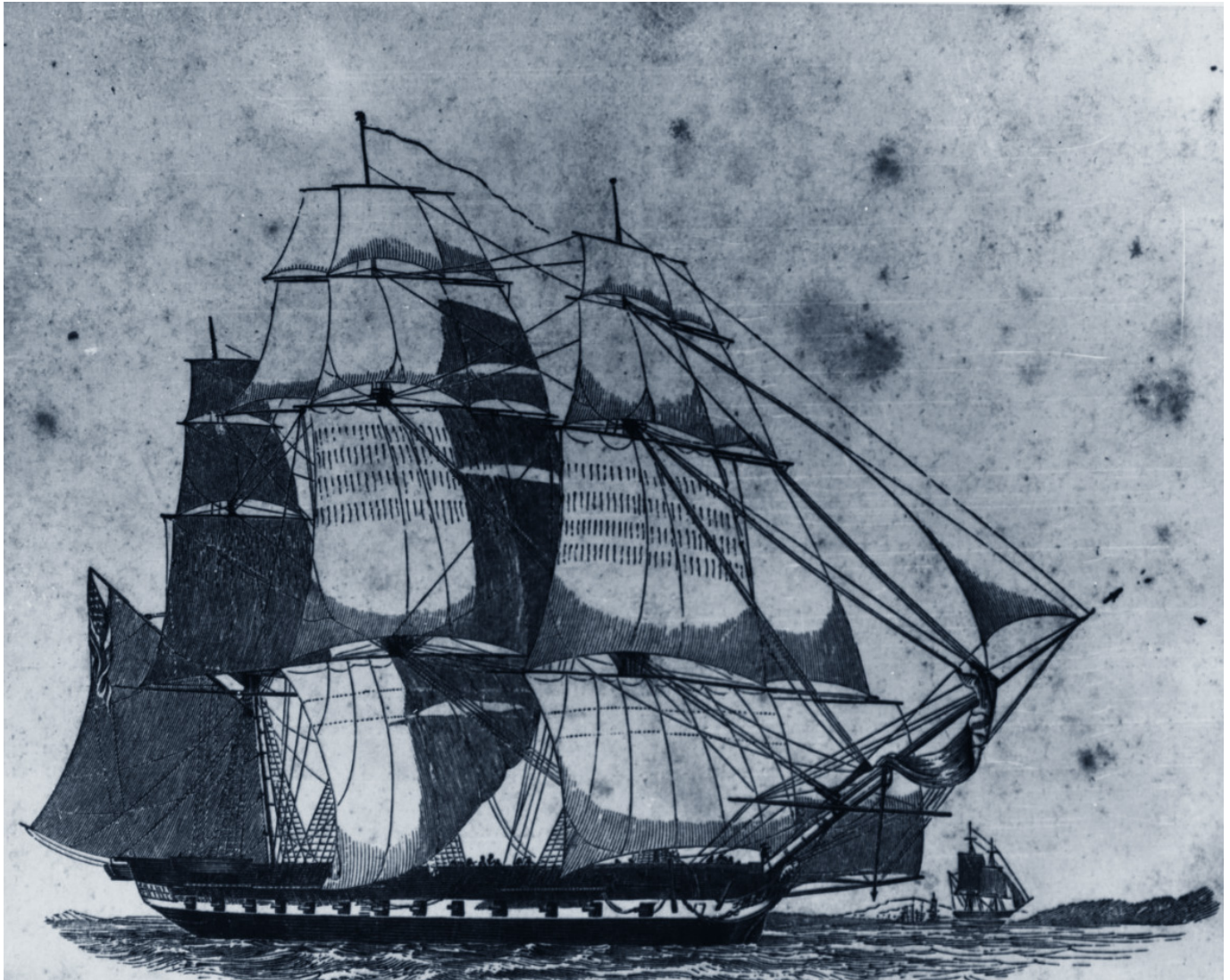
Edward Jenner administering the first vaccine, 1796. Painting by Robert Thom. Courtesy of National Library of Medicine

In the ensuing years both vaccination and variolation were practiced by Navy physicians, but was not necessarily widespread nor compulsory.

When Commodore Oliver Hazard Perry ordered Surgeon Usher Parsons to vaccinate the crew of USS *Java* before its departure to the Mediterranean (where smallpox was rampant) no other sailors in the squadron had been vaccinated.

However successful in his mission, Parsons later made note of Sailors who “failed to report themselves for inoculation.” Eighteen of them were later attacked with the disease.

On December 1, 1848 Secretary of the Navy John G. Mason issued a Navy Circular making the smallpox vaccination mandatory for recruits at the time of enlistment. Navy physicians at the rendezvous (recruiting station) were required to make note of every recruit who was vaccinated and each quarter were responsible for filing reports listing the total number vaccinated as well as the total number of recruits who exhibited evidence of prior smallpox contagion.



Engraving of USS United States. In 1799, Surgeon Edward Cutbush inoculated crewmembers of the ship against smallpox. Naval History and Heritage Command

Making the vaccine compulsory did not totally eliminate smallpox from the service and outbreaks did occur throughout the nineteenth and into the twentieth centuries.

Between 1848 and 1870, there were 1,481 reported cases of smallpox in the Navy. Of these 135 were fatal.

By the 1870s, Navy physicians explored causes for outbreaks—e.g., looking at those who avoided inoculations—and investigated concepts like vaccine storage/shelf life, limited immunity and revaccination.

The administration of the smallpox vaccination continued well into the twentieth century and the Navy not only vaccinated its Sailors and Marines but often local populations overseas where the Navy deployed.

As the threat of smallpox subsided, the Navy gradually scaled back on vaccinations. In 1972, the United States stopped vaccinating civilians against smallpox and by 1980 the World Health Organization (WHO) declared the world free of the virus.

The U.S. military still offered vaccinations to recruits until 1990 when the Department of Defense discontinued the practice except under unique circumstances (e.g., personnel deployed to “high-threat areas.”)

Typhoid, Tetanus and Medical Research

With the advances of medical science and public health in the early twentieth century came new vaccines designed to lessen the impact of disease on our fighting force. Beginning in 1909, the Army adopted anti-typhoid vaccine and began vaccinating soldiers on a volunteer basis. The following year the Navy began vaccinating Sailors and Marines against typhoid. Between December 1911 and June 1913, over 80,000 sailors were inoculated with the full course of the typhoid vaccine ultimately ensuring the eradication of typhoid in the fleet and expeditionary forces.

In the 1930s, the Navy set a course to eliminate the threat of tetanus in the service. Beginning in 1934, the Navy pioneered what had been the largest experimental tetanus toxoid study ever conducted on a control population. The study offered promising results and showed that the body’s resistance to the disease was greater than the “natural or artificial introduction of an antigen.” In 1938, the Navy Medicine inoculated the entire student body at the Naval Academy (2,300 midshipmen) with an alum-precipitated tetanus toxoid and in 1941 BUMED initiated a tetanus immunization program for all Navy and Marine personnel using the alum-precipitated toxoid.



Tetanus Shots aboard USS Nevada in February 1945

During World War II the Navy vaccinated for cholera, diphtheria, plague, smallpox, tetanus, typhoid, paratyphoid A and paratyphoid B, epidemic typhus, and yellow fever. The Navy also began standing up special medical research laboratories that spearheaded the development of new antigens and vaccines.

On January 31, 1941, the Navy mobilized a small medical research laboratory on the campus of the University of California at Berkeley under the helm of Capt. Albert Krueger, a noted expert on respiratory diseases and a Reserve Medical Corps officer. Originally authorized by the Bureau of Medicine and Surgery (BUMED) on October 1, 1934, this Naval Reserve Laboratory Research Unit No. 1—as it was known—had been the brainchild of Krueger. Within the first 14 months of mobilization, the lab organized a series of studies on epidemic influenza, developed a rapid detection technique for influenza viruses, conducted a monumental study on air-borne infections on Navy and Marine Corps shore stations, prepared emergency stocks of types A and B influenza virus vaccines for use on the West Coast, and

investigated natural immunity against influenza viruses. On January 17, 1944, this laboratory was renamed Naval Medical Research Unit No. 1 (NAMRU-1).

During the 1940s and 1950s, other NAMRUs as well as their parent command—the Naval Medical Research Institute (NMRI) in Bethesda, Md. (the forerunner of today's Naval Medical Research Center in Silver Spring, Md.)—helped to develop experimental vaccines for scrub typhus and trachoma and established programs for the improvement and standardization vaccines used by the Armed Forces.

Polio and Dependent Care

Beginning in the 1930s, the National Foundation for Infantile Paralysis led a highly successful media campaign to bring attention to the poliomyelitis or polio. Images of crippled children, and people in iron lungs haunted the minds of many a parent and child in the Baby-Boom era. During the summer months (aka, the “polio season”), the disease could sweep through cities in epidemic form, and spread through mere contact with unwashed hands, contaminated water or food. In 1949, more than 42,000 cases were diagnosed in the United States; in 1952, more than 57,000 cases were reported.

Navy dependents with polio were typically treated on a case-by-case basis. And during cases of local outbreaks, certain naval hospitals operated special polio wards for dependents.

Hope against the disease came in the form of Dr. Jonas Salk's formalin-inactivated vaccine, better known as the “Salk Polio Vaccine.” In what has been called the largest public health experiment in human history, more than 1.5 million school children across 211 U.S. counties and 44 states were vaccinated with Dr. Jonas Salk's miracle cure in 1954. The very next year, field trial moderators had proclaimed the vaccine to be a resounding success. Salk was feted as an American hero and overnight achieved fame few medical researchers could ever attain.

This cure led to the Department of Defense's first policy on the procurement, distribution and administration of the vaccine to military facilities. In an unprecedented move, the Department of Defense allocated the Salk Vaccine not only for all dependents of uniformed service personnel but also dependents of civilian employees of the Army, Navy and Air Force as well.

Under this policy, from July 1955 to June 1956, Navy medical facilities administered vaccines to 246,927 military dependents. By 1957, 40 percent of all active duty and 66 percent of all Navy and Marine Corps dependents were vaccinated against polio. The incidence of polio in the Navy and Marine Corps dropped from 187 cases (19.4 incidence rate) in 1954 to a mere 19 cases in 1957 (2.1 incidence rate) in 1957. Nation-wide, the Salk vaccine would come close to annihilating polio. The 15,000 diagnosed cases in 1956 dropped down to 7,000 in 1957 and half that in 1958.